Embedded System Requirements

System level requirements

1. Receive parameters and display them
2. Control mechanical system
3. Display needed information
4. Standard UI: power on-off, pumping start-stop
5. Alarms and safety
6. Calibrate system to receive new bag and zero position

Controls that are external to the embedded system

1. Mixing valve that mixes air and input oxygen i.e. controls input oxygen concentration
2. Humidifier
3. PEEP valve if used.

Platform choice

1. Mechanical system: Arduino/Atmel
2. UI : Arduino/Atmel
3. Remainder/Main control: RaspberryPi

Mechanical system

Sensors

1. FiO2 Sensor: <<Part No>>
2. Differential Pressure sensor: <<Part No>>

Actuators

1. Stepper motor that drives the Pumping-Arm: <<Part No>>
2. Oxygen-to-patient Valve: <<Part No>>

Output assumptions

1. Length of full travel of pumping arm determines Tidal Volume
2. Instantaneous velocity of travel arm, at its current position determines pressure at input to ET tube

Unknowns

1. How many readings per second from sensor?
2. How granular can we control the stepper motor?
3. What is “zero position”?

Calibration:

1. Full travel length means how many ml? This may vary across bags

To Do

Embedded System requirements - User interface & Display

Sensors: 4 rotating knobs, power on-off switch, start/stop ventilating switch
Output device: TBD

Control parameter setting
1. Tidal Volume
2. Breathing Rate
3. Pressure
4. Target FiO2

To Do
1. Get accurate Ranges for above.
2. All of display requirements